DOCUMENT RESUME

ED 246 404 CS 007 708

AUTHOR Hirsh-Pasek, Kathy; Freyd, Pamela
TITLE Vocabulary Development: How Deaf Individuals Can Learn to Use the Information Given.
PUB DATE 10 May 84
NOTE 22p.; Paper presented at the Annual Meeting of the International Reading Association (29th, Atlanta, GA, May 6-10, 1984).
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Academic Aptitude; *Deafness; Grade 7; Grade 8; Junior High Schools; Measures (Individuals); Microcomputers; Morphemes; *Morphology (Languages); Reading Ability; *Reading Research; Reading Skills; *Visual Literacy; *Vocabulary Development; *Word Recognition
IDENTIFIERS *Online Reading

ABSTRACT

To determine if people analyze words in online reading, an experiment was conducted with 12 congenitally deaf, second generation sign language users with a reading level of 6.64 on a standardized reading achievement test. The hearing controls included seventh and eighth grade students who were matched for reading level. Both groups were split in half to form high and low reading groups. The experiment was conducted using an Apple II microcomputer and a certified interpreter was always present. The measure used was the speed of reaction time to certain stimuli. Subjects were told that -ment was the target and that they were to push a button when they found the letters -ment in a sentence. Reaction times were measured at all points. Results showed that the deaf subjects stored word boundary items as base word plus ending (for example, payment as pay ment) but that they did not do the same with morpheme boundary items. It was further found that deaf subjects were sensitive to spelling changes. The findings suggest that deaf readers engage in visual word analysis while reading, doing so predominantly for the productive word boundary endings that do not cause spelling or sound changes. (Appended is a morphological analysis of skilled deaf readers.) (HOD)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

X This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

ED246404

Vocabulary Development: How Deaf Individuals Can Learn to Use the Information Given

Paper presented at
The International Reading Association
SIG Hearing Impaired
Atlanta, Georgia
10 May 1984

Kathy Hirsh-Pasek, Ph.D.
Swarthmore College
Pamela Freyd, Ph.D.
Philadelphia School District

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

Pamela Freyd

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

CS007708

I am very happy to be here again this year and I thank you for changing the schedule to accommodate the conflict of events that made it necessary. It gives me great pleasure to share the research findings of my colleague, Dr. Kathy Hirsh-Pasek, and myself with all of you who are working so hard to improve the reading skills of deaf people.

Are you aware that as of 1981, 74% of all the reading programs used in schools of the deaf are basal, "phonics" programs? (Hasenstab & McKenzie, 1981; Bockmiller & Coley, 1981). This is a fact worth reflection. The very foundation of these phonics programs rests on the skill with which the deaf have the least proficiency - mapping print to sound. Kathy and I are continually amazed that any deaf person is ever taught to read an alphabetic sound-based text. While much research in reading of deaf people has focused on all those skills that the deaf are lacking, we have focused our research on deaf individuals who have mastered the system and become good readers. Our aim is to determine the strategies that successful deaf readers use to compensate for their lack of sound. We believe this approach will lead us into a deaper understanding of the reading process itself. We believe we will be able to use our findings to develop and validate instructional methods that will help other deaf people become better readers.

Today I will focus on one strategy that we have found successful deaf readers do tend to use, the visual analysis of print into what we call morphological units: the analysis of words like JOYFUL into its component parts of JOY and FULL.
The talk will proceed in four main parts:

(1) First, I will discuss briefly the current status of reading process theories and questions raised by these theories.

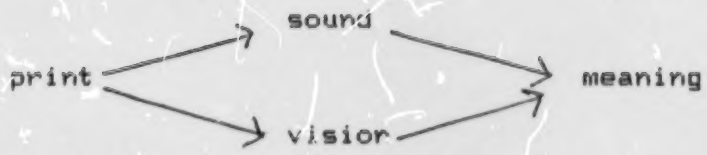
(2) Second, I will outline how the information that has been collected from deaf readers has begun to flesh out these theories and to raise more questions about what goes on in the reading process.

(3) Third, I will focus on one aspect of the deaf reading research - morphological analysis. I will argue that the word analysis skills that develop through a visual analysis of print are predictive of reading success.

(4) Fourth, I will point out the theoretical relevance of our morphological research and the practical implications of this work for those who teach reading to deaf people.

Let me begin with a discussion of the reading process. How do we read a simple sentence such as the one in Table 1? (He bought a beautiful new refrigerator.) By now, you have probably read the sentence and comprehended it. There are a number of processes that you used when you read the sentence as quickly as you did. You made a visual analysis of the printed letters. You analyzed the relationships between the concepts that were represented. And you comprehended the individual words. You could not read the sentence at all if you did not grasp the meanings of the individual words.

An enormous amount of research on how people read and comprehend individual words has resulted in the conclusion that translating print into sound is indispensable to learning to read. This is bad news for the deaf. Yet we all know that reading is not just a matter of translating print into sound without attention to visual details. If we process through sound alone, the following sentence which sounds perfectally good, should pose no problem for the reader: Chute hymn inn the haul. The fact that it does pose a problem suggests that we attend to the visual symbols. Thus researchers came to posit a dual theory of reading like the one represented in Table 3.



Today, most endorse a dual process theory of reading with sound translation as a necessary component in learning to read and as an auxilliary process in fluent reading. The visual route is thought to be organized around whole visual words (Smith 1971). Hence, this process model offers a theoretical backdrop for the debate between whole word and phonic methods of teaching reading.

While this model does bring psychological processing in line with educational tradition, there seems to be something missing. Look back and reread the sentence in Table 1. Do we really sound our some words and visually memorize others? I doubt it. We can also realize the complexity of words like beautiful and note that it is derived from two separate units BEAUTY and FUL. This missing link becomes apparent when we examine the composition of our writing system. As Chomsky 1970) and others have pointed out, our writing system or orthography is not exclusively alphabetic or sound based. Nor is it fixated on whole words. Rather, it contains a morphological component that encodes linguistically rich words and word parts that act in combination to generate new words. For example, take the oft cited

word pairs TELEGRAPH and TELEGRAPHY. Were our writing system totally alphabetic, the latter would be spelled T-E-L-A-G-R-A-P-H-Y . Here we abandon the alphabetic representation. But we also abandon whole word representation, for all of you probably attended to the relevant word parts TELE and GRAPH and Y that are productive, visually represented units of meaning in our language. That is, you note that TELE appears in words like TELEPHONE, TELECOMMUNICATION, etc.

Before examining how this morphological information might fit into a model of the reading process, we need to understand the linguistics of the morphology and consider why such a route might prove important to the dead reader. Morphology is defined as the study of the structure of words and the rules that govern their uses. By way of example, the ending ER is a very productive one in our language and is one that transforms verbs like FARM and TEACH into nouns like FARMER and TEACHER.

There are several types of morphological variables in the language. The first division is between INFLECTIONAL and DERIVATIONAL morphology. Inflectional morphology includes endings like ING for DRIVE into DRIVING or S transforming "The girl is" into "The girls are." Inflectional endings have to do with tense marking or verb agreement and all are governed by the syntax of the language.

Derivational endings, in contrast, are not bound by sentence structure. Rather, they transform words from onw word class into another word class as in example TEACH/TEACHER.

There are two types of derivational endings: word boundary and morpheme boundary endings. Word boundary endings are German in origin and incllude examples like those in Table 4 of your handout. Morpheme boundary endings tend to be French in origin. Word boundary endings do not cause stress changes - nor do they cause resultant spelling changes in the base words. Try for example encamp - encampment, fair - fairly. Morpheme boundary items, however often cause shifts in pronunciation and/or in the spelling of the base word: relate - relative.

(2)

The questions that Kathy and I have persued are:

a) In the absence of a sound-based route, do deaf individuals find it useful to translate print into another mode?

b) Can deaf readers - in principle - learn to read without this sound-based translation?

c) Might deaf individuals compensate for their lack of sound through increased sensitivity to the visual information in the print. Perhaps deaf people abstract these cues and make more use of them than do readers who can rely on sound.

Our research has three parts:

1. We have studied whether deaf people are sensitive to the morphology in English.

2. Do deaf people (or hearing people) use this morphological knowledge in the actual process of reading?

3. Can training in morphological skills help improve vocabulary and reading?

Last year at this meeting, I presented the preliminary results to our first question: Are deaf people consciously aware of morphological components in English? We studied 17 second generation deaf adults and 17 hearing controls matched for reading level. I do not have time today to review the three experiments, but I can report on our major findings.

First, we have overwhelming evidence that deaf readers are sensitive to the morphological information represented in the writing system.

Second, deaf readers seem to be more sensitive to this knowledge than are average hearing readers who can default to a sound translation.

Third, word analysis skills in deaf develop through attention to visual properties of the writing system. Our readers were not translating words into sign language.

Fourth, deaf readers err on spelling change words and do not show evidence of attention to syllabic or sound based information. Hearing subjects are swayed by potential sound information.

While these results take us a long way towards understanding how the deaf reader might go from print to meaning, it does not give us the relationship between visual analysis and reading competence. We know people can use this knowledge, but we don't know if they do use it. (3)

Today I'll report on pilot data that Kathy and I have just finished analyzing that begins to give us some exciting information in this area. I am reporting on a study that attempts to determine if people actually do analyze words in on-line reading. Our subjects were 12 congenitally deaf, second generation signers with a reading level of 6.64 on the Stanford. Our hearing controls were 7th and 8th graders from a public school in Philadelphia who were matched for reading level. In our data analysis we split both groups in half to form high and low reading groups. The experiment was conducted using an Apple IIe microcomputer and a certified interpreter was always present. Our experiment was a probe experiment and our measure was the speed of reaction time to certain stimuli. Subjects were told that they would see 100 sentences of this type: (Table 5)

-ment	a. paint store
He took the pigment to the ------	
payment	b. umbrella

Subjects were told that -ment was the target and that they were to push a button when they found the letters -ment in the sentence. The choice of ending words did not appear on the screen. When subjects were ready to pick an ending they pushed another button and the

completion choices appeared alone on the screen. Reaction times were measured at all points.

The logic behind the experiment led us to expect that subjects would find the -ment faster in a derived word such as payment because there was a morpheme boundary there. We expected that it would take longer to find a derivational ending in a word that was not derived such as pigment. If our hypothesis is correct, the difference score which is calculated as control sentence less test sentence should be positive and significantly greater than zero. (A zero difference in processing pigment and payment would indicate that both are being processed as whole words.)

We presented the sentences without ending words so that subjects would be forced to read for comprehension and not just be able to scan for letter pattern recognition. We checked to be sure that subjects knew the meanings of all words that were used. The sentences were presented in random order and we used a variety of endings of different types. Word frequencies were equated for control items and test items

At this time we have analyzed the data of the derived endings, word boundary and morpheme boundary. We find that subjects are decomposing

word boundary items like PAYMENT $t(11)=1.46$, $p<.10$, but that they are not decomposing morpheme boundary items. (SLIDE). There is a significant difference in the performance of word boundary vs morpheme boundary itmes overall $F(1,10)=24.3$, $p<.01$. It appears that deaf subjects store word boundary items as base word plus ending (eg. PAYMENT as PAY MENT) but that they do not do the same with the morpheme boundary items.

We found that one morpheme boundary item was causing particular difficulty - even for our good readers. It was the only item that went in the wrong direction; it was the ending AGE. On closer inspection we realized that the source of the difficulty lay in the test words, the only words in our experiment that involved a spelling change. As we had noticed in the word analysis task, deaf readers were extremely sensitive to spelling changes. Without the AGE ending, we found that our high readers showed evidence of word analysis with both morpheme and word boundary endings, but that the low readers showed analysis with the word boundary types only. So it seems that deaf readers can engage in visual word analysis while reading. They do so predominately for the productive word boundary endings that do not cause spelling or sound change. This result is consistent with other findings in the literature (Bradley, 1978; Garrett, 1975; Freyd & Baron, 1982 among others).

Word analysis can occur while reading for meaning and it seems to separate the good from the poor readers. When we compare hearing and deaf subjects, we find no overall significant differences. We do find significant differences between the low hearing and the low deaf on word boundary items however. (SLIDE). Note that low deaf readers score significantly higher $t(10)=1.6$, $p<.10$. It appears that the morpheme boundary words are especially difficult for the low deaf readers and we suspect that the difficulty here arises because these endings so often cause spelling changes in their bases.

Our results seem to indicate that subjects can analyze morpheme structure while reading and this analysis relates to reading success. Further, this ability to analyze morphemes is highly linked to visual sensitivity and visual analysis. This is precisely the area in which deaf readers -- whose sensitivity to visual information is apparent in their spelling scores -- can excel.

(4)

What do we see as the practical implications of our work? The next phase of our research involves designing training programs with the hope that some practical teaching methods will be proved successful. Since 50% of the criticisms against current deaf curriculum focus on vocabulary (Hasenstab & McKenzie, 1981), our purpose will be to help develop methods that will make deaf students more independent word learners. For every word that a child learns, it is estimated that there are an average of one to three additional related words that should also be understandable. Just how many words would depend on the child's skill at using context and morphological rules (Nagy & Anderson, 1984). Anderson & Freebody (1983) have shown that good readers in middle grades actively apply morphological rules to help figure out new words. Freyd & Baron (1981) have shown that better readers make use of morphological knowledge in learning new words.

One of the first things that we would consider carefully are the words to be introduced to students. Most vocabulary lists are constructed from frequency word lists. The most frequent words are usually taught first. However, it is from the less frequent words that we find derived words. Frequency should not be the only criterion for creating vocabulary lists. New words should probably be introduced as families. In our training studies we intend:

Reevaluate current vocabulary lists and introduce new words in families. For that end we will ask students to practice:

a) exercises in which students identify complex words and their morphemes.

b) exercises in which students classify the suffixes as to type i.e. inflectional or derivational.

c) exercises in which students classify suffixes as to whether they cause spelling/sound changes in the base, i.e. -ness vs -ity.

d) exercises in which students change words from one word class to another, i.e. teach - teacher, nation - national.

e) reading passages using protocols to help focus students' awareness of how to apply context and morphological rules to figure out the meanings of new words. Teacher modeling might also be of benefit in actual reading in which an unknown word is encountered.

In conclusion, Kathy and I are convinced that further work in morphological development in deaf students is especially important, because this is an area in which deaf students may compensate for their lack of sound by greater use of visual analysis.

THE USE OF MORPHOLOGICAL ANALYSIS BY SKILLED DEAF READERS

HANDOUT

Kathy Hirsh-Pasek, Ph.D.
Swarthmore College
Pamela Freyd, Ph.D.
The Greenfield School

The talk will proceed in four main parts:

(1) First, I will discuss briefly the current status of reading process theories and on questions raised by these theories.

(2) Second, I will outline how the information that has been collected from deaf readers has begun to flesh out these theories and to raise more questions about what goes on in the reading process.

(3) Third, I will focus on one aspect of the deaf reading research - morphological analysis. I will argue that the word analysis skills that develop through a visual analysis of print are predictive of reading success.

(4) Fourth, I will point out the theoretical relevance of our morphological research and the practical implications of this work for those who teach reading to deaf people.

THE USE OF MORPHOLOGICAL ANALYSIS BY SKILLED DEAF READERS

HANDOUT

Kathy Hirsh-Pasek, Ph.D.
Swarthmore College
Pamela Freyd, Ph.D.
The Greenfield School

Table 1: An examole
He bought a beautiful new refrigerator.

Table 2: An example
CHUTE HYMN INN THE HAUL

Table 3: A dual process theory of reading

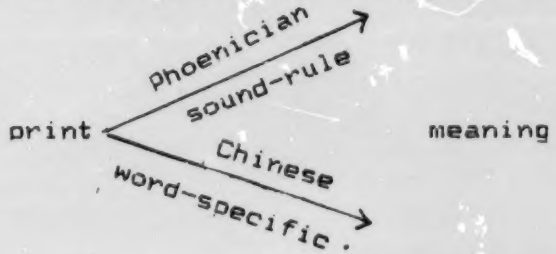


Table 4: Sample endings by tyoe

inflection	morpheme boundary	word boundary
ing	al	ment
ed	le	ster
s	age	er
	en	ly
		ish

Table 5: READING TASK Sample Sentence

ment
He brought the pigment to the _____ a. paint store
payment b. umbrella

Table 6: READING TASK Item Analysis

hi/lo comparison for word boundary vs morpheme boundary

d - scores in msec

	word type	
	word boundary	morpheme boundary
hi (6)	$\bar{x}$ 351	13.5
	s 481	622
lo (6)	$\bar{x}$ 714	-245
	s 1314	904

Table 7: Applications

1) Reevaluate current vocabulary lists and introduce new words in families.
2) Practice exercises in which students identify complex words and their morphemes.
3) Practice exercises in which students classify the suffixes as to type i.e. inflectional or derivational.
4) Practice exercises in which students classify suffixes as to whether they cause spelling/sound changes in the base. i.e. ness vs ity
5) Practice exercises in which students change words from one word class to another. i.e. teach - teacher; nation - national
6) Practice with reading passages using protocols to help focus students awareness of how to apply context and morphological rules to figure out the meanings of new words.
7) Practice exercises in which the teacher models an approach to figure out the meaning of new words using morphological analysis.

BIBLIOGRAPHY

Baron,J. Orthographic and word-specific mechanisms in children's reading of words. Child Development, 1979, 50, 60-72.

Berko,J. The child's learning of English morphology. Word ,1958, 14 ,150-177.

Bolster,A. Toward a more effective model of research on teaching. Harvard Educational Review ,1983, 53 ,294-308.

Bradley,D. Computational distinctions of vocabulary type. Unpublished doctoral dissertation. MIT,1978.

Brockmiller,P. and Coley,J. A survey of methods, materials, and teacher preparation among teachers of reading to the hearing impaired. Reading Teacher, 1981, 526-529.

Chomsky,C. Reading, writing, and phonology. Harvard Educational Review , 1970, 40 , 287-309.

Clarke,B.R. The deaf child's learning of English morphology. Audiology and Hearing Education , 1978, 4 , 12-16.

Conrad,R.L. The deaf school child . London:Harper & Row, 1979.

Cooper,R.L. The ability of deaf and hearing children to apply morphological rules. Journal of Speech and Hearing Research , 1967, 10 , 77-85.

Cooper,R.L. The development of morphological habits in deaf children. In Rosenstein and McGintie, (Eds.), Research studies on the psychological behavior of deaf children , Research Monograph B2 - Council for Exceptional Children, Reston, Va. 1965.

Davis,F.B. Two new measures of reading ability. Journal of Educational Psychology , 1942, 33 , 365-372.

Decker,N., Loeterman,M., Shulman,J., Wilbur,R., and Wilson,K. Readable English for hearing-impaired students. Multi level Captioning Project, WGBH-TV, Boston,Mass., 1980.

Derwing,B. and Baker,W. Recent research on the acquisition of English morphology. In P.Fletcher and M.Garman (Eds.), Language acquisition , Cambridge:Cambridge University Press,1979.

Derwing,B. and Baker,W. The psychological basis for morphological rules. In J.Macnamara (Ed.), Language and thought , New York:Academic Press, 1977.

DiFrancesca,S. Academic achievement results of a national testing program for hearing impaired students,United States:Spring,1971 . Washington,D.C.:Gallaudet College, 1972.

Freyd,P. Individual differences in acquisition and use of English derivational morphology. Unpublished doctoral dissertation. University of Pennsylvania, 1981.

Freyd,P. and Baron,J. Individual differences in acquisition of derivational morphology. Journal of Verbal Learning and Verbal Behavior ,1982, 21 ,282-295.

Furth,H.G. Deafness and learning:a psychosocial approach . Belmont,California:Wadsworth Publishing Company Inc., 1973.

Furth,H.G. A comparison of reading test norms of deaf and hearing children. American Annals of the Deaf ,1966, 111 ,461-462.

Hanson,V., Liberman,I., & Shankweiler,D. Linguistic coding by deaf children in relation to beginning reading success, in press.

Hanson,V. Short-term recall by deaf signers of American Sign Language:Implications of encoding strategy for order recall. Journal of Experimental Psychology:Learning,Memory, and Cognition ,1982, 8 ,572-583.

Hasenstab,S. and McKenzie,C. A survey of reading programs used with hearing-impaired students. Volta Review ,1981, 83 ,383-388.

Hirsh-Pasek,K. Phonics without sound. In preparation.

Hirsh-Pasek,K. Phonics without sound:Reading acquisition in the congenitally deaf . Unpublished doctoral dissertation, University of Pennsylvania, 1981.

Hirsh-Pasek,K & Freyd,P. Deaf readers' ability to analyze morphological regularities. (Paper delivered at International Reading Association Annual Convention, Anahejm,CA, May,1983). Available from Educational Resources Information Center (ERIC),1984.

Hirsh-Pasek,K. & Treiman,R. Recoding in silent reading: Can deaf children translate print into a more manageable form? Volta Review, 1982, 15, 5, 71-83.

Huey,E.B. The psychology and pedagogy of reading . Cambridge:MIT Press,1968. (Originally published New York:Macmillan,1903.)

Jen-McDermott,M. A Model of the reading process. Doctoral dissertation for Brown University, 1983. Portions in press.

Johnson,D., Toms-Bronowski,S. & Pittelman,S. Vocabulary development. Volta Review ,1982, 84 ,11-24.

La Sasso,C. National survey of materials and procedures used to teach reading to hearing impaired children. American Annals of the Deaf ,1978,Feb.,22-30.

Liberman,I.Y., Shankweiler,D., Liberman,A., Fowler,C., & Fischer,W. Phonetic segmentation and recoding in the beginning reader. In A.Reber & L.Scarborough (Eds.), Toward a psychology of reading ,1977,202-227.

Lichtenstein,E. The relationship between reading processes and English skills of deaf college students: Part I & Part II. In press.

Mann,V. Reading skill and language skill. In press.

Matthews,P.H. Morphology:an introduction to the theory of word-structure . Cambridge:Cambridge University Press, 1974.

Mattingly,I.G. Reading, the linguistic process and linguistic awareness. In J.K.Kavanaugh and I.G.Mattingly (Eds.), Language by ear and by eye . Cambridge:MIT Press, 1972.

Meadow,K.P. Deafness and child development . London:Edward Arnold, 1980.

Meadow,K.P. Early manual communication in relation to the deaf child's intellectual, social, and communicative functioning. American Annals of the Deaf ,1968, 113 ,29-41.

Olson,R.K., Kliegl,R., Davidson,B.J., & Foltz,G. Individual and developmental differences in reading disability. To appear in T.G.Waller (Ed.), Reading Research: Advances in theory and practice. New York: Academic Press.

Quigley,S. Reading series for the deaf. Paper delivered to PRIT, Harrisburg, PA, August, 1979.

Quigley,S.P., Power,D.J. & Steinkamp,M.W. The language structure of deaf children. Volta Review ,1977, 79 ,73-84.

Quigley,S. and King,C. Reading Milestones . Beaverton,Oregon:Dormac,Inc.,1981.

Shand,M.A. Sign-based short-term coding of American Sign Language signs and printed English words by congenitally deaf signers. Cognitive Psychology ,1982, 14 ,1-12.

Snowling,M.J. The development of grapheme-phoneme correspondence in normal and dyslexic readers. Journal of Experimental Child Psychology, 1980, 29, 294-305.

Treiman,R. and Hirsh-Pasek,K. Silent reading:insights from second-generation deaf readers. Cognitive Psychology ,1983, 15 ,39-65.

Trybus,R.J. & Karchmer,M.A. School achievement scores of hearing impaired children: National data on achievement status and growth patterns. American Annals of the Deaf ,1977, 122 ,62-69.

Walter,G. Lexical abilities of hearing and hearing-impaired children. American Annals of the Deaf ,1978, 123 ,975-982.